

#9/RCE

PTO/SB/30 (09-03)

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**Request  
for  
Continued Examination (RCE)  
Transmittal**Address to:  
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Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Application Number	09/655,722
Filing Date	09/18/2001
First Named Inventor	Peterson
Art Unit	2815
Examiner Name	Eugene Lee
Attorney Docket Number	SD-6436.1

This is a Request for Continued Examination (RCE) under 37 CFR 1.114 of the above-identified application. Request for Continued Examination (RCE) practice under 37 CFR 1.114 does not apply to any utility or plant application filed prior to June 8, 1995, or to any design application. See Instruction Sheet for RCEs (not to be submitted to the USPTO) on page 2.

1. **Submission required under 37 CFR 1.114** Note: If the RCE is proper, any previously filed unentered amendments and amendments enclosed with the RCE will be entered in the order in which they were filed unless applicant instructs otherwise. If applicant does not wish to have any previously filed unentered amendment(s) entered, applicant must request non-entry of such amendment(s).

- a. ☒ Previously submitted, if a final Office action is outstanding, any amendments filed after the final Office action may be considered as a submission even if this box is not checked.
- i. ☒ Consider the arguments in the Appeal Brief or Reply Brief previously filed on 08/12/2003
- ii. ☐ Other \_\_\_\_\_
- b. ☒ Enclosed
- i. ☒ Amendment/Reply
- ii. ☐ Affidavit(s) Declaration(s)
- iii. ☐ Information Disclosure Statement (IDS)
- iv. ☐ Other \_\_\_\_\_

**2. Miscellaneous**

- a. ☐ Suspension of action on the above-identified application is requested under 37 CFR 1.103(c) for a period of \_\_\_\_\_ months. (Period of suspension shall not exceed 3 months; Fee under 37 CFR 1.17(f) required)
- b. ☐ Other \_\_\_\_\_

**3. Fees**

The RCE fee under 37 CFR 1.17(e) is required by 37 CFR 1.114 when the RCE is filed.

The Director is hereby authorized to charge the following fees, or credit any overpayments, to Deposit Account No. 19-0131

- a. ☒ RCE fee required under 37 CFR 1.17(e)
- ii. ☒ Extension of time fee (37 CFR 1.136 and 1.17)
- iii. ☐ Other \_\_\_\_\_
- b. ☐ Check in the amount of \$ \_\_\_\_\_ enclosed
- c. ☐ Payment by credit card (Form PTO-2036 enclosed)

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**SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT REQUIRED**

Name (Print/Type)	Robert D. Watson	Registration No. (Attorney/Agent)	45,804
Signature	<i>Robert D. Watson</i>	Date	09/25/2003

**CERTIFICATE OF MAILING OR TRANSMISSION**

I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to: Mail Stop RCE, Commissioner for Patents, P. O. Box 1450, Alexandria, VA 22313-1450 or facsimile transmitted to the U.S. Patent and Trademark Office on the date shown below.

Name (Print/Type)	Robert D. WATSON	Date	09-25-2003
Signature	<i>Robert D. Watson</i>		

This collection of information is required by 37 CFR 1.114. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Mail Stop RCE, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

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FEE TRANSMITTAL FOR FY 2003		Complete if Known	
Patent fees are subject to annual revision. Small Entity payments <u>must</u> be supported by a small entity statement. Otherwise large entity fees must be paid. See Forms PTO/SS-09-12.		Application Number	09/955,722
		Filing Date	09/18/2001
		First Named Inventor	Peterson
		Examiner Name	Eugene LEE
		Group / Art Unit	2815
TOTAL AMOUNT OF PAYMENT (\$) <b>1680.</b>		Attorney Docket No.	SD-6436.1
METHOD OF PAYMENT (check one)		FEE CALCULATION (continued)	
1. <input checked="" type="checkbox"/> Indicated fees and credit any over payments to: Deposit Account Number <b>19-0131</b> Deposit Account Name <b>Sandia Laboratories</b> <input checked="" type="checkbox"/> Charge Any Additional Fee Required Under 37 CFR 1.16 and 1.17 2. Payment Enclosed: <input type="checkbox"/> Check <input type="checkbox"/> Money Order <input type="checkbox"/> Other		3. ADDITIONAL FEES Large Fee Code Small Fee Code Fee Description Fee Paid 1051 130 2051 66 Surcharge - late filing fee or cash 1052 50 2052 25 Surcharge - late provisional filing fee cover sheet 1053 130 Non-English specification 1804 920* Requesting publication of SIR prior to Examiner action 1805 1,840 Requesting publication of SIR after Examiner action 1251 110 2251 55 Extension for reply within first month 1252 410 2252 205 Extension for reply within second month 1253 930 2253 465 Extension for reply within third month 1254 1,450 2254 725 Extension for reply within fourth month 1256 1,970 2256 985 Extension for reply within fifth month 1401 320 2401 180 Notice of Appeal 1402 320 2402 180 Filing a brief in support of an appeal 1403 280 2403 140 Request for oral hearing 1451 1,510 Petition to institute a public use proceeding 1452 110 2452 55 Petition to revive - unavoidable 1453 1,300 2453 650 Petition to revive - unintentional 1501 1,300 2501 645 Utility issue fee (or reissue) 1502 470 2502 235 Design issue fee 1503 630 2503 315 Plant issue fee 1460 130 Petitions to the Commissioner 1806 180 Submission of Information Disclosure Stmt 1809 750 2809 375 Filing a submission after final rejection (37 CFR 1.129(a)) 1810 750 2810 375 For each additional invention to be examined (see 37 CFR 1.129(b)) Other fee (specify) <u>Request for Continuing Exam.</u> 750 Other fee (specify) *Reduced by Basic Filing Fee Paid SUBTOTAL (3) (\$) <b>1680</b>	
FEE CALCULATION 1. BASIC FILING FEE Large Fee Code Small Fee Code Fee Description Fee Paid 1001 750 2001 375 Utility filing fee 1002 330 2002 165 Design filing fee 1003 520 2003 280 Plant filing fee 1004 750 2004 375 Reissue filing fee 1005 180 2005 90 Provisional filing fee SUBTOTAL (1) (\$) 2. EXTRA CLAIM FEES Total Claims <input type="checkbox"/> - 20** = <input type="checkbox"/> X <input type="checkbox"/> = <input type="checkbox"/> Independent Claims <input type="checkbox"/> - 3** = <input type="checkbox"/> X <input type="checkbox"/> = <input type="checkbox"/> Multiple Dependent <input type="checkbox"/> = <input type="checkbox"/> **or number previously paid, if greater; For Reissues, see below. Large Fee Code Small Fee Code Fee Description Fee Paid 1202 18 2202 9 Claims in excess of 20 1201 84 2201 42 Independent claims in excess of 3 1203 280 2203 40 Multiple dependent claims, if not paid 1204 84 2204 42 **Reissue independent claims over original patent 1205 18 2205 9 **Reissue claims in excess of 20 and over original patent SUBTOTAL (2) (\$)			

SUBMITTED BY		Complete (if applicable)	
Typed or Printed Name	Robert D. Watson	Reg. Number	45,604
Signature	<u>Robert D. Watson</u>	Deposit Account User ID	19-0131
Date	09/24/03		

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TO: : Examiner Eugene Le  
Fax No. : 703-872-9319  
FROM : Robert D. Watson, # 45,604  
Sandia National Laboratories  
(505) 845-3139 (Voice)

**OFFICIAL**

Applicant : Peterson  
Application No. 09/955,722  
Subject: Reply with RCE  
Docket No. : SD-6436.1

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# 10/C

Application No. 09/955,722  
SD-6436.1 S-97675

Application No. 09/955,722  
Applicant: Peterson  
Title: Temporary Coating for Protection of Microelectronic Devices  
During Packaging  
Filing Date: 09/18/2001  
Art Unit 2815  
Examiner Eugene Lee  
Docket No.: SD-6436.1

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SEP 25 2003

OFFICIAL

Assistant Commissioner for Patents  
Box RCE  
Washington DC 20231

September 25, 2003

**Request for Continuing Examination (RCE) under 37 CFR 1.114  
and  
Reply to the Advisory Action**

Dear Sir:

In response to the Advisory Action of 09/09/2003, applicants submit herein a **Request for Continuing Examination (RCE)** under 37 CFR 1.114 of the above identified application. Applicants also submit a **Reply** to the Advisory Action.

Applicants respectfully request that the Office reconsider the patentability of the invention in light of the arguments and amendments presented herein. Applicants submit the following in complete response thereto.

Applicants herewith petition the Assistant Commissioner of Patents under 37 CFR 1.136(a) to **extend the time** for reply to the Final Office dated 04/16/2003. The Office is hereby authorized to charge **Deposit Account # 19-0131** for any necessary fees regarding this Reply, the Request for Continuing Examination, the petition to extend the time for reply, and any future reply(s) requiring a petition for an extension of time under 37 CFR 1.136(a).

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## INTRODUCTORY COMMENTS

### Claim History

- Claims 1-34 were originally filed on 09/18/2001.
- In the First Amendment dated 02/03/2003:
  - claims 31-34 were cancelled in response to a restriction requirement, as being drawn to a non-elected invention;
  - claims 15 and 16 were cancelled;
  - claims 1, 10, 17, 19, 25, 28, 29 and 30 were amended; and
  - new claims 35-44 were added.
- In the Amendment after Final dated 08/12/2003:
  - claim 28 was amended (however, the amendment was not entered by the Office)
- Claims 1-14, 17-30 and 35-44 are currently pending.

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### CLAIM AMENDMENTS

• Please amend the Claims as follows:

1. (previously amended) A temporarily protected wafer, comprising:  
a sensitive area disposed on a surface of the wafer; and  
a vapor-deposited, water-insoluble temporary protective coating directly contacting  
and covering the sensitive area;  
wherein the protective coating is insoluble in organic solvents;  
wherein the coating remains in place during singulation of the wafer into individual  
device dies; and further  
wherein a sufficient amount of the coating is removed to activate the sensitive area  
prior to completing packaging of the die.
2. (original) The temporarily protected wafer of claim 1, wherein the sensitive area  
comprises a released MEMS device.
3. (original) The temporarily protected wafer of claim 1, wherein the sensitive area  
comprises a pressure-sensitive microsensor.
4. (original) The temporarily protected wafer of claim 1, wherein the sensitive area  
comprises a chemically sensitive microsensor.
5. (original) The temporarily protected wafer of claim 1, wherein the sensitive area  
comprises a temperature-sensitive microsensor.
6. (original) The temporarily protected wafer of claim 1, wherein the sensitive area  
comprises a released IMEMS device.
7. (original) The temporarily protected wafer of claim 1, wherein the temporary  
protective coating comprises a vacuum vapor-deposited coating.
8. (original) The temporarily protected wafer of claim 7, wherein the vacuum vapor-  
deposited coating comprises a parylene polymer.
9. (original) The temporarily protected wafer of claim 8, wherein the parylene coating is  
selected from the group of parylene polymers consisting of poly-para-xylylene,  
poly-para-xylylene modified by the substitution of a chlorine atom for one

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aromatic hydrogen, and poly-para-xylylene modified by the substitution of a chlorine atom for two aromatic hydrogens.

10. (previously amended) The temporarily protected wafer of claim 8, wherein the parylene coating comprises a copolymer compound formed by blending a reactive parylene monomer with a reactive material.
11. (original) The temporarily protected wafer of claim 10, wherein the reactive material comprises a monomer containing an element selected from the group consisting of silicon, carbon, and fluorine, and combinations thereof.
12. (original) The temporarily protected wafer of claim 1, wherein the temporary protective coating comprises silicon dioxide, silicate glass, or silicon nitride.
13. (original) The temporarily protected wafer of claim 1, wherein the temporary protective coating comprises a metal.
14. (original) The temporarily protected wafer of claim 13, wherein the metal comprises aluminum or tungsten.
15. (CANCELLED)
16. (CANCELLED)
17. (previously amended) The temporarily protected wafer of claim 1, wherein the temporary protective coating comprises one or more materials selected from the group consisting of a carbon film, an amorphous carbon film, and a diamond-like carbon film.
18. (original) The temporarily protected wafer of claim 1, wherein the temporary protective coating comprises a self-assembled monolayered material.
19. (previously amended) The temporarily protected wafer of claim 1, wherein the temporary protective coating comprises perfluoropolyether.
20. (original) The temporarily protected wafer of claim 1, further comprising exposed bond pads.
21. (original) The temporarily protected wafer of claim 1, wherein the temporary protective coating is deposited using a Chemical Vapor Deposition (CVD) process.

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22. (original) The temporarily protected wafer of claim 1, wherein the temporary protective coating is deposited using a Plasma Enhanced Chemical Vapor Deposition (PACVD) process.
23. (original) The temporarily protected wafer of claim 1, wherein the temporary protective coating is deposited at essentially ambient temperature.
24. (original) The temporarily protected wafer of claim 1, wherein the temporary protective coating is deposited by polymerizing a monomeric gas on at least the sensitive area.
25. (previously amended) A temporarily protected die, comprising:  
a sensitive area disposed on a surface of the die; and  
a vapor-deposited, water-insoluble temporary protective coating directly contacting and covering the sensitive area;  
wherein the protective coating is insoluble in organic solvents; and  
wherein a sufficient amount of the coating is removed to activate the sensitive area prior to completing packaging of the die.
26. (original) The temporarily protected die of claim 25, wherein the sensitive area comprises a released MEMS device.
27. (original) The temporarily protected die of claim 26, wherein the temporary protective coating comprises a parylene polymer.
28. (CURRENTLY AMENDED) A temporarily protected wafer, comprising:  
a sensitive area disposed on a surface of the wafer comprising a released MEMS device having a released MEMS element;  
a performance-enhancing coating disposed directly on the released MEMS element; and  
a vapor-deposited, water-insoluble temporary protective coating disposed directly on top of the performance-enhancing coating;  
wherein the protective coating is insoluble in organic solvents; and  
wherein the coating remains in place during singulation of the wafer into individual device dies, and further wherein a sufficient amount of the coating is removed to re-release the MEMS element prior to completing packaging of the die, without removing the performance-enhancing coating.



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29. (previously amended) The temporarily protected wafer of claim 28, wherein the performance-enhancing coating comprises one or more materials selected from the group consisting of an anti-stiction film, an adhesion-inhibiting film, a lubricant, and a nitrated-surface.
30. (previously amended) The temporarily protected wafer of claim 28, wherein the performance-enhancing coating comprises one or more materials selected from the group consisting of perfluoropolyether, hexamethyldisilazane, and perfluorodecanoic carboxylic acid.
- 31-34. (CANCELLED)
35. (previously added) The temporarily protected wafer of claim 1, wherein the temporary protective coating is insoluble in organic solvents heated to less than or equal to 150 C.
36. (previously added) The temporarily protected wafer of claim 1, wherein the temporary protective coating is excluded from covering any wafer streets.
37. (previously added) The protected die of claim 25, wherein the die is mechanically attached and electrically interconnected to a package.
38. (previously added) The die of claim 37, wherein the sensitive area comprises a released MEMS element.
39. (previously added) The die of claim 37, wherein the die is wirebonded to the package.
40. (previously added) The die of claim 37, wherein the die is flip-chip bonded to the package.
41. (previously added) The die of claim 38, wherein the temporary protective coating is sufficiently thick so as to immobilize the released MEMS element.
42. (previously added) The die of claim 38, wherein the temporary protective coating is sufficiently thin so as to not immobilize the released MEMS element.
43. (previously added) A protected die, comprising:  
a sensitive area disposed on a surface of the die, the area comprising a released MEMS device having a released MEMS element;  
a performance-enhancing coating disposed directly on the released MEMS element; and

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a vapor-deposited, water-insoluble temporary protective coating disposed directly  
on top of the performance-enhancing coating;

wherein the protective coating is insoluble in organic solvents; and

wherein the die is attached and electrically interconnected to a package.

44. (previously added) The die of claim 43, wherein the temporary protective coating is  
sufficiently thin so as to not immobilize the released MEMS element.

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## REMARKS

### Status of Claims

- Claims 1-14, 17-30 and 35-44 are currently pending.

### Amendments to the Claims

Applicants have amended claim 28, which includes the limitation "*wherein the protective coating is insoluble in organic solvents*".

### Comments on the Previously filed Amendment after Final

Applicants submitted an Amendment after Final on 08/12/2003. Applicants desire that the same amendments and arguments presented regarding the claim rejections be re-considered in this RCE, in addition to new arguments presented below.

### 103 Rejections

In the Advisory Action dated 09/09/2003, the Office repeated the rejections of claims 1-14, 17-27 and 35-42 under 35 USC 103(a) as being unpatentable over *Kao et al.* in view of *Wu et al.*

### Issue #1. The Office has failed to make a *prima facie* case of Obviousness.

In order to make a *prima facie* case of obviousness, the Office **must show** that the combination of references (*Kao et al* and *Wu et al*) teach all of the elements recited in Applicant's claims.

*Kao et al* **does not teach** a vapor-deposited protective layer that is insoluble in water or organic solvents, which is directly in contact with the sensitive area. Instead, *Kao* teaches a water soluble layer (which is **not a water insoluble material**) directly in contact with released MEMS structures.

*Wu et al* **does not teach** a vapor-deposited protective layer that is insoluble in water or organic solvents, which is directly in contact with the sensitive area. Instead, *Wu* teaches that the material directly in contact with the sensitive area is a thick (e.g., 10 mil) layer of a **silicon elastomer** (which is **not a vapor-deposited material**). *Wu* then teaches that a parylene material is then applied as a **second layer on top of** the silicon elastomer first layer. In *Wu*, the parylene second layer protects the silicon elastomer first layer from jet fuel and oil. However, *Wu* does not teach a parylene layer that is directly in contact with the sensitive area. *Wu* simply does not recognize the problem of large hydrodynamic forces applied to fragile released MEMS structures

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when liquid baths are used to remove the protective coating; *Wu* never discusses this aspect of MEMS fabrication.

Since neither *Kao* or *Wu* teach a vapor-deposited protective layer that is insoluble in water or organic solvents, which is directly in contact with the sensitive area (as recited in applicant's claims 1-14, 17-27 and 35-42) then **not all of the elements are present** in the combined references. Therefore, a *prima facie* case of obviousness cannot be made, and the rejections should be withdrawn.

**Issue #2. The Office has failed to provide any teaching, suggestion, or motivation to make the combination of *Kao et al* with *Wu et al*.**

The Office has failed to present any line of reasoning, specific understanding or principle within knowledge of a skilled artisan, or objective evidence that **teaches, suggests or motivates** why a person of ordinary skill in the art would make the combination of *Kao et al.* and *Wu et al.*

The Office improperly uses **hindsight** in choosing prior art references to combine in its 103 rejections (See MPEP 2145).

Without such a teaching, suggestion, or motivation to combine *Kao et al* with *Wu et al.*, the rejections of claims 1-14, 17-27 and 35-42 under 35 USC 103(a) is improper and should be withdrawn.

**Issue #3. The references cited by the Office teach away from making the combination.**

*Kao* teaches away from using a water insoluble material (such as parylene) as a protective layer directly in contact with released MEMS structures:

*"A significant problem with use of photoresist or any other substantially water insoluble material as the protective layer is the requirement of a post saw clean[ing] operation using environmentally unfriendly solvents (i.e., acetone) to remove the protective layer from the surface of the wafer and associated microelectromechanical systems".*

(See *Kao et al.*, Col. 1, lines 56-65)

*Kao's* solution to this problem (*which is the gist of his invention*) is to use a **water soluble** protective layer that is directly in contact with the MEMS structures, so that undesirable solvents (like acetone) don't need to be used when removing the temporary coating; all that is needed is a simple water bath. *Kao* simply does not recognize the problem of large hydrodynamic forces applied to fragile, released MEMS structures when using liquids (i.e., water) to remove the protective coating.

Claims 1-14, 17-27 and 35-42 require that the protective coating directly in contact with the sensitive area be water insoluble. *Kao* clearly teaches away from this.

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It is improper to combine these two references when the references themselves teach away from their combination (See MPEP 2145.X.D2). Accordingly, the rejections are improper and should be withdrawn.

Rejection of Claims 28-30 and 43-44 under 35 USC 103(a)

The office rejected claims 28-30 and 43-44 under 35 USC 103(a) as being unpatentable over *Kao et al.* in view of *Smith et al.*

In response, applicants have amended claim 28 to recite, *inter alia*, a limitation that the protective coating is insoluble in organic solvents. Claim 43 includes the same limitation.

As admitted by the Office, *Kao et al.* does not teach that the protective coating directly in contact with the sensitive area is insoluble in organic solvents. Since neither *Kao et al.* nor *Smith et al.*, either alone or in combination, teach all of the limitations of claims 28 and 43, a *prima facie* case of obviousness cannot be made, and, hence, the rejections should be withdrawn.

Accordingly, claims 28 and 43 are now in condition for allowance.

Claims 29-30 depend from claim 28. As presented above, claim 28 is now in condition for allowance. All claims depending from an allowed claim are allowable. Therefore, claims 29-30 are now in condition for allowance.

Claim 44 depends from claim 43. As presented above, claim 43 is now in condition for allowance. All claims depending from an allowed claim are allowable. Therefore, claim 44 is now in condition for allowance.

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### CONCLUSION

Applicants have responded to each and every objection and rejection, and urge that claims 1-14, 17-30 and 35-44 as presented are now in condition for allowance. Applicants request expeditious processing to issuance.

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Respectfully submitted,

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I hereby certify that this correspondence was transmitted via facsimile to the U.S. Patent and Trademark Office at phone no. 703-872-9319 on

09/25/2003 (date).

Robert D. Watson

Robert D. Watson